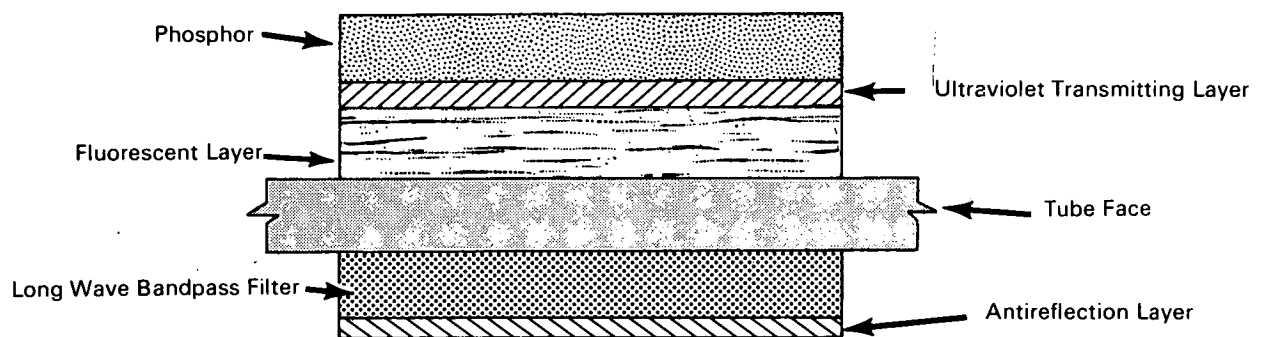


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Multilayer Screen Gives Cathode Ray Tube High Contrast



Fabrication Layers of High Contrast Cathode Ray Tube

Designers and manufacturers of display instruments should know about this novel fabrication method for high contrast cathode ray tubes. This technique features compatibility with vacuum bakeout procedures and temperature, conformability to curved surfaces, applicability to large areas, use of ordinary tooling procedures, and economy of manufacturing operations.

To remove tube size limitations and permit economical fabrication, low-cost siloxane resin formulations containing particulate or dissolved materials substitute for expensive thin glass filters and fluorescent glasses previously employed. The resins contain sufficient methyl or phenyl groups for solubility in organic solvents. After vaporizing the solvent, a short baking cycle drives off the organic groups, leaving a polymerized material stable under vacuum and under the temperatures required for tube fabrication.

The fabrication method provides for low diffuse reflectance of ambient light. Employing nonreciprocal filtering overcomes objections to earlier approaches for applications involving high ambient illumination levels, such as in aircraft cockpits.

The cathode ray tube face consists of a layer of ultraviolet emitting phosphor upon which the electron beam impinges; a second layer of shortwave bandpass filter material to transmit this energy; a third layer of fluorescent material that converts the short wavelength energy into visible energy; and a final layer consisting of a longwave bandpass filter which transmits this visible energy, while simultaneously blocking shortwave energy which could stimulate the fluorescent layer. Since the two filters have no mutual bandpass, no ambient energy can reach the phosphor layer to be reflected with concomitant reduction in the contrast of imagery displayed on the tube face. The tube face appears black except where information is being presented.

An embodiment of the invention is shown in the drawing. The tube face serves as a substrate upon which several layers are deposited. Powdered fluorescent glass in a glass resin carrier comprises the fluorescent layer. After applying the formulation and drying to obtain a thickness of 3 to 10 mils, baking the coating polymerizes the resin. The fluorescent glass used must have reasonable conversion efficiency

(continued overleaf)

and a refractive index matching that of the glass resin.

The ultraviolet transmitting layer (see drawing) must be thin to avoid lateral spreading of energy from the phosphor into the fluorescent layer. This requirement eliminates the need of matching refractive indices, since the broadening due to refraction in thin layers is negligible here.

A thin film of magnesium fluoride is evaporated on the front surface to reduce further the ambient illumination.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Headquarters
National Aeronautics
and Space Administration
Washington, D.C. 20546
Reference: TSP70-10454

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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